

## NextGen for Airports, Volume 4: Leveraging NextGen Spatial Data to Benefit Airports: Guidebook

### DETAILS

---

104 pages | 8.5 x 11 | PAPERBACK

ISBN 978-0-309-44596-2 | DOI 10.17226/24604

BUY THIS BOOK

FIND RELATED TITLES

### AUTHORS

---

Mark Ricketson; Airport Cooperative Research Program; Transportation Research Board; National Academies of Sciences, Engineering, and Medicine

### Visit the National Academies Press at [NAP.edu](http://NAP.edu) and login or register to get:

---

- Access to free PDF downloads of thousands of scientific reports
- 10% off the price of print titles
- Email or social media notifications of new titles related to your interests
- Special offers and discounts



Distribution, posting, or copying of this PDF is strictly prohibited without written permission of the National Academies Press. (Request Permission) Unless otherwise indicated, all materials in this PDF are copyrighted by the National Academy of Sciences.

# E Presentation Outline and Template



## Agenda

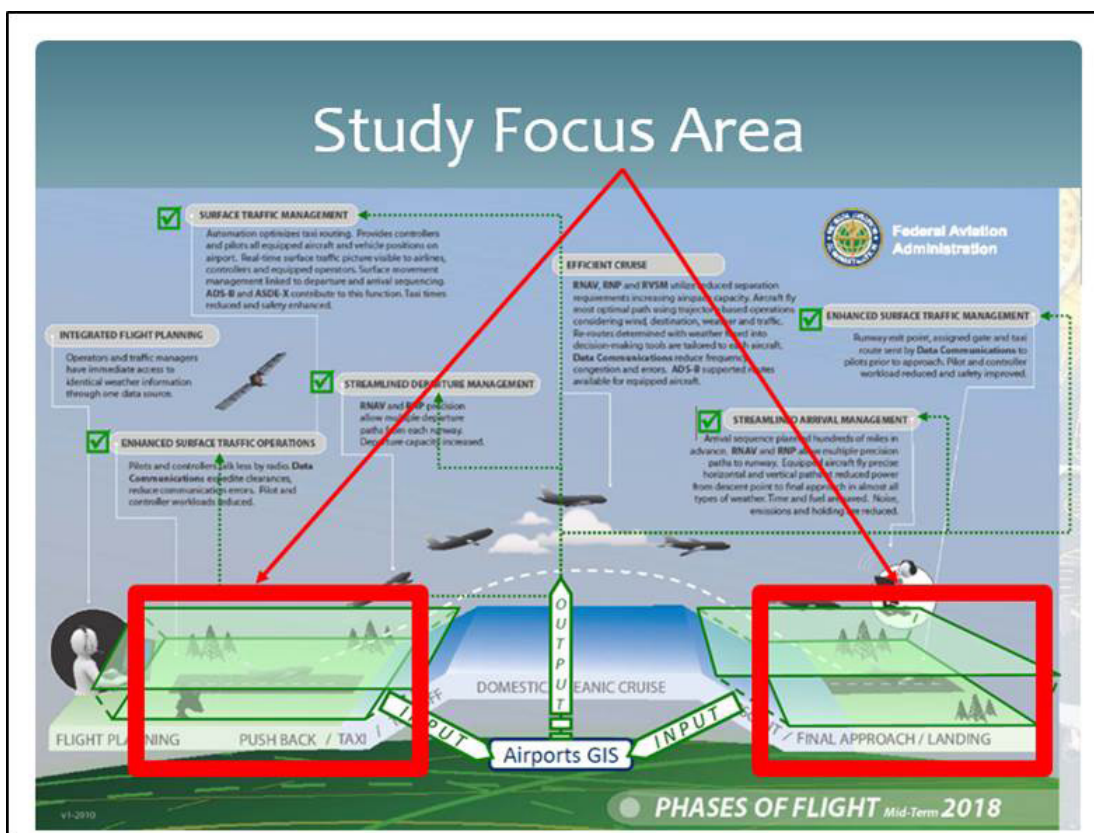
- \* ACRP Project 09-12
  - \* Problem Statement
- \* What is NextGen?
- \* Spatial Data and Why it's Important to NextGen
- \* Spatial Data Types
  - \* NextGen Programs That Use or Require Spatial Data
- \* Benefits & Costs to Airports
  - \* Discussion on Cost
  - \* Increasing Your Chances of Realizing These Benefits
- \* Summary & Recommendations for Further Research

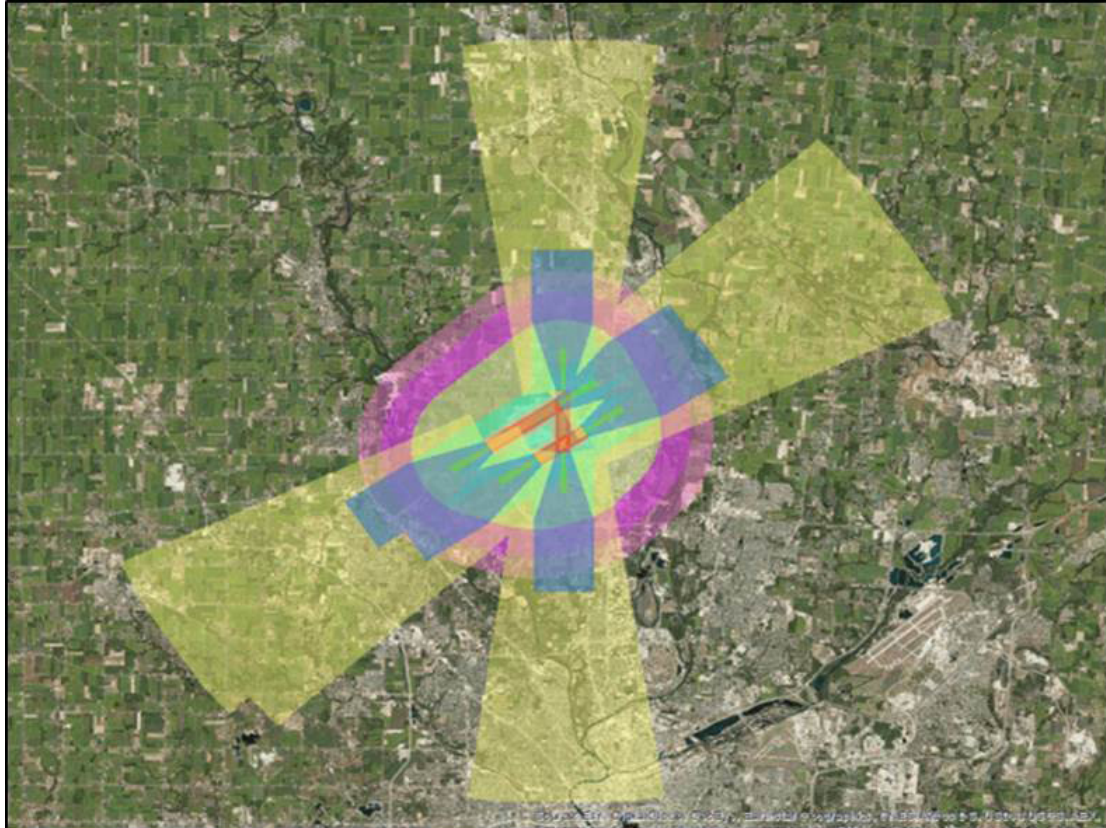
## ACRP NextGen Projects

- \* 09-12 is one of five concurrent ACRP projects focused on NextGen, which are concluding in Spring 2016
- \* 01-27, A Primer
- \* 01-28, Guidance for Engaging Airport Stakeholders
- \* 03-33, Airport Planning and Development
- \* 03-34, Understanding the Airport's Role in PBN
- \* **09-12, Leveraging NextGen Spatial Data to Benefit Airports**

# 09-12 Problem Statement

What are the benefits that can be derived from spatial data that is to be collected in support of the FAA's NextGen effort? How do NextGen programs use this data and how can airports maximize use of this data?





## NextGen

- \* NextGen is the modernization of the air transportation system
    - \* Improvements to air traffic management (ATM) technologies and procedures
    - \* Airport infrastructure
    - \* Includes environmental, safety and security-related enhancements
- (Source: FAA - The Business Case for the Next Generation Air Transportation System; FY 2014)*
- \* NextGen consists of many different programs with multiple priorities and requirements

## NextGen Priorities

- \* In 2015 four NextGen Priorities were identified
  - \* Focus on those programs that will have the greatest impact on the air transportation system in the near term



Multiple Runway Operations



Performance Based Navigation



Surface Operations and Data Sharing



Data Communications

## NextGen and Spatial Data

- \* Some programs in NextGen have a need for spatial data
- \* The sources for this spatial data can come from multiple organizations
- \* Airports create spatial data through AGIS and other means
- \* NextGen also creates spatial data
- \* Airports receive direct benefits from the use of their spatial data in NextGen programs
- \* Airports also receive direct benefits from NextGen programs that use third party or FAA legacy data sets

## Why Spatial Data is Important to NextGen

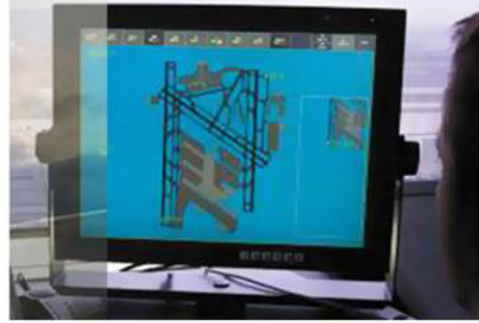
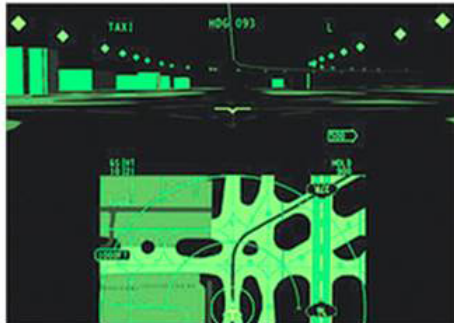
- \* High accuracy data supports key programs such as PBN and Multiple Runway Operations
  - \* Safety
  - \* Improvements to the environment
  - \* Improved flight procedures
- \* Programs such as Surface Operations utilize third party sources that airlines and airports benefit from
  - \* Airfield operational efficiencies
  - \* Improved safety in aircraft and vehicle movements

## An Example of AGIS Spatial Data

The screenshot shows an AGIS software interface with a map of an airport. A yellow polygon representing a runway end is highlighted, and a red arrow points from the 'Identify' window to it. The 'Identify' window displays the following data:

Field	Value
OBJECTID	7
Shape	Point Z
Global Unique Id	<null>
Name	EUR_10R
Ellipsoid Height	-101.164
Description	EUR_10R
Approach Category	D
Approach Guidance	VERTICAL
Accelerate Stop Distance Avail	0
Magnetic Bearing	103.71032
True Bearing	117.79365
Design Group	V
Displaced Distance	0
Landing Distance Available	0
Runway End Designator	10R
Runway Slope	0
Take Off Distance Available	0
Take Off Runway Available	0
Touchdown Zone Slope	0
Touchdown Zone Elevation	9
Threshold Type	Normal
Status	ACTIVE
Alternative	0
User Flag	3110
Comments	<null>
CADD Layer Name	C-RUNW-END-
CADD Layer Description	<null>
CADD Layer Color	<null>
Date Data Acquired	<null>
Date Source	<null>
QA_ID	7

## Other Spatial Data Applications

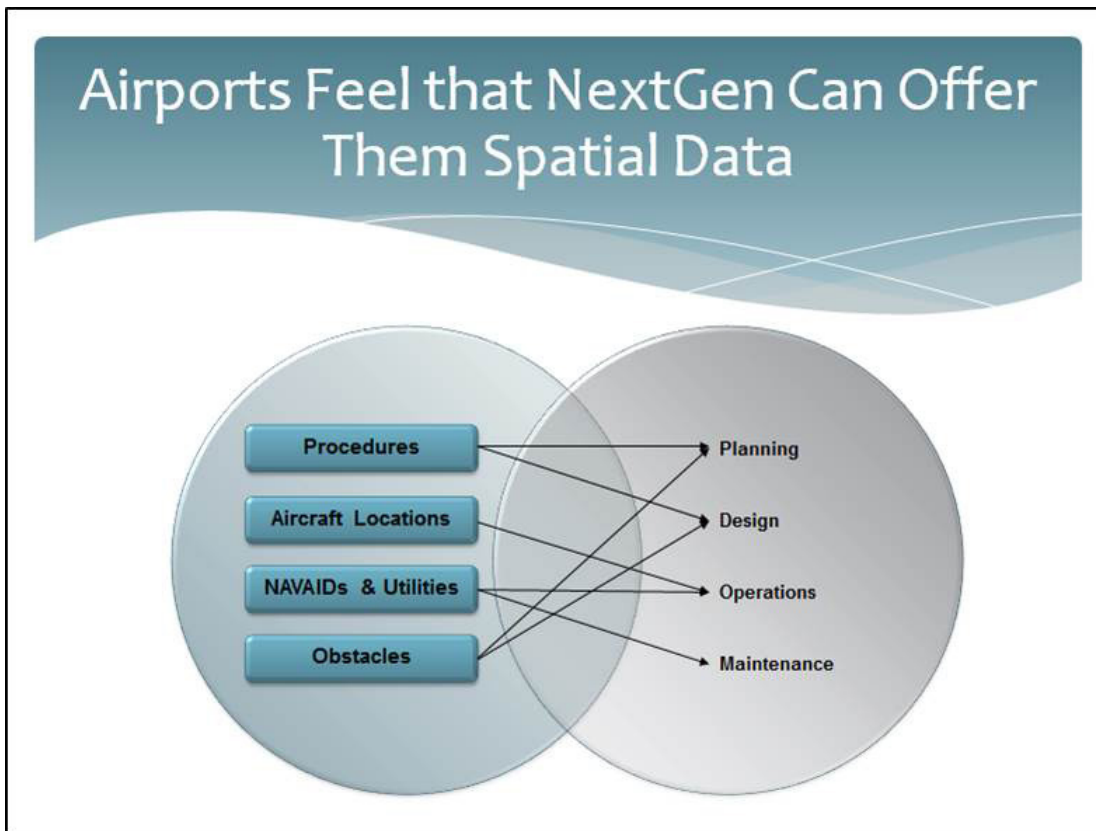


Source: Cockpit Guidance Gets Down To The Ground  
 Mar 25, 2013 [John Croft](#) | Aviation Week & Space Technology

## Some Definitions

- \* **Spatial Data**
  - \* **Geometry** (e.g., points lines and polygons) that show the location and shape of tangible (e.g., runway), intangible (e.g., obstruction id surface), manmade (e.g., building), natural (e.g., tree), current (e.g., today's runway), and future (e.g., planned extension) objects in relation to their position on (i.e., 2D) and above (i.e., 3D) the face of the earth
  - \* **Attributes** add details about the object (e.g., size, color)
  - \* **Metadata** add details about the data itself (e.g., when it was collected)
- \* **Layers** are collections of similar objects (e.g., runways)
- \* **Maps** are collections of multiple layers (e.g., runways, taxiways, aprons, etc. = Airport Layout Plan) with symbology





## Benefits and Costs

- \* There is a perception that airports bear new costs but do not reap new rewards for the collection of spatial data.
- \* Airports are in fact gaining new capacity, reducing minimums, and increasing safety because they have collected this data.
- \* These benefits, unfortunately, have not been as apparent or as well documented as the costs.
- \* The system-wide benefit to cost ratio of spatial data for procedure design is immeasurably high.
- \* The problem is that from an airport's perspective the costs are immediate, tangible, and not-optional, but the benefits are prolonged and indirect.

## Summary - NextGen

- \* "NextGen" has many meanings
- \* Airports find it difficult in clearly understanding what their roles and responsibilities are for NextGen
- \* Under NextGen, there is an increasing need for high quality, current, and accurate spatial data depicting airports, as well as airspace around airports
- \* Not all NextGen initiatives or programs within NextGen require or produce spatial data

## Summary - AGIS

- \* FAA's Airports Geographic Information Systems (AGIS) program has long been called an "enabler" of NextGen
- \* While there is a clear and direct link between AGIS and PBN, many of the programs do not currently utilize the FAA's AGIS data
- \* For many of these programs, spatial data is now needed for more airports than AGIS can currently provide
- \* Many NextGen capabilities rely on spatial data produced by third party vendors
- \* 1/3 of top 30 airports have still not done a full AGIS project however there is a push by FAA to get these done

## Summary - Spatial Data Outside of AGIS

- \* Airports can benefit from the spatial data that NextGen initiatives produce (e.g., aircraft positions, FAA-installed NAVAIDS & utilities)
- \* Through the use of third party or FAA legacy spatial data in NextGen, airports are receiving benefits.
  - \* Situational awareness technologies using ASDE-X data
  - \* Spatial data technologies that share data between the TRACON and the airport tower
  - \* Heads up displays in the cockpit for low-visibility
- \* These are indirect benefits; safety, efficiencies, revenue

## Recommendations for Additional Research

- \* Consideration for UAS in NextGen
  - \* The integration of UAS into the national airspace is a high priority for the FAA and related agencies. An in depth study of the spatial data needs for UAS planning and operations and ways in which GIS can support UAS is recommended.
  
- \* Common set of spatial data standards
  - \* DO 272 and AC 150/5300-18 are two standards that are either required or recommended for spatial data development. An assessment of the potential for merging them into one industry standard is warranted.

*Abbreviations and acronyms used without definitions in TRB publications:*

A4A	Airlines for America
AAAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI-NA	Airports Council International-North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act (2015)
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TDC	Transit Development Corporation
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

**TRANSPORTATION RESEARCH BOARD**  
500 Fifth Street, NW  
Washington, DC 20001

ADDRESS SERVICE REQUESTED

*The National Academies of*  
SCIENCES • ENGINEERING • MEDICINE

The nation turns to the National Academies of Sciences, Engineering, and Medicine for independent, objective advice on issues that affect people's lives worldwide.

[www.national-academies.org](http://www.national-academies.org)

ISBN-13: 978-0-309-44596-2  
ISBN-10: 0-309-44596-5



NON-PROFIT ORG.  
U.S. POSTAGE  
**PAID**  
COLUMBIA, MD  
PERMIT NO. 88